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THE VETERINARY JOURNAL

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NOVEMBER, 1936.

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NOVEMBER, 1936

Editorial

THE VETERINARY COURSE.

FOR the past two or three years the number of applicants for admission to the veterinary course has been steadily increasing, and this year the colleges have been compelled to refuse a large number of prospective students. Each of the five colleges affiliated to the R.C.V.S. has admitted as many students as can be accommodated, and there are waiting lists at some of them for the session 1937–1938. It is interesting to consider the reason for this increase in the number of persons who desire to become veterinary surgeons. It may be due in part to the uncertainties of business in these days, which may have led some parents to choose a profession for their sons rather than a business career; but the chief reason is that veterinary science has been more in the public eye of recent years, and the profession is coming to be better known. The propaganda used over the appeal for the rebuilding of the Royal Veterinary College in London has made it a matter of public concern, and in Scotland there has just been issued a public appeal for funds for the extension of the Royal (Dick) Veterinary College.

The coming session will be the fifth since the inauguration of the five-year course, so that in July, 1937, the first of the five-year course graduates will be due for registration. The Council of the Royal College of Veterinary Surgeons

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has been constantly studying the syllabus, and several amendments have been introduced into the scheme which was adopted four years ago. The institution of *practical* examinations throughout the course, in addition to the written and oral examinations, has been found to be an advantage to the student, and has met with the approval of both the teachers and examiners. There are no doubt still a few imperfections which require attention, but these will be the subject of consideration as questions arise. One very important innovation of the new scheme is the provision that every candidate before presenting himself for the final examination must submit certificates to show that he has: (*a*) satisfactorily attended cases of disease and/or accident, and has had experience in general practice among the larger farm animals for a minimum period of six months; and (*b*) attended at least six cases of parturition *in the larger farm animals.*

For this purpose the authorities of the affiliated colleges have appointed a number of general practitioners to form panels of "extra-mural teachers," with whom students can see the necessary practice. *All candidates are required to keep records of the cases they have seen, and extra-mural teachers are required to attest their case-books before they are presented to the authorities of the college and the examiners.*

It is hoped therefore that graduates under the five-year course will possess more *practical* knowledge than it was perhaps right to expect from graduates under the former system. This is not to say that we agree that practitioners should expect new graduates to be as expert as themselves, for that is an unfair standard to look for. Indeed, when they themselves were new graduates the established practitioners of the day were declaiming that their new assistants knew nothing of practice, *and that has been the criticism of practitioners from time immemorial, both in medicine and veterinary medicine.* The opportunities for seeing practice now provided by the college regulations should go far to remove the cause of such criticism in the future.

Another provision of the new regulations is that candidates for the final examination will be expected to be acquainted with the legal responsibilities of the veterinary surgeon in general practice, and in both medicine and surgery the examiners will ask questions to test the candidate's knowledge in this respect. Everyone who knows how often legal questions crop up in practice, and how frequently the veterinary surgeon has to comply with the provisions of certain statutes and orders, will agree that this is a most important part of a veterinary student's training.

The Council of the Royal College of Veterinary Surgeons has decided to give notice that in respect of candidates who desire to enter on the veterinary course in and after the session commencing October, 1938, the minimum standard of general education will be that of University matriculation. This means that students who present the school certificate, which is at present acceptable if it shows that the applicant has passed on the credit standard in three subjects, will in future be required to gain five credits, including English, mathematics, a language other

than English, and two other approved subjects. The number of students who are taking a University degree in veterinary science has of late become very much increased, and when the new regulations are in force it is certain that a much larger proportion will take the double course.

THE TREATMENT OF FOOT-AND-MOUTH DISEASE BY INOCULATION.

THE Report of the Chief Veterinary Officer for the Bechuanaland Protectorate, which we print the substance of, appears to be of particular interest because :

(1) It is the first time that foot-and-mouth disease has been successfully dealt with on a large scale by inoculation. During the first outbreak in 1933 in the Bechuanaland Protectorate 760,000 cattle were inoculated intranasally, using virulent blood ; and in the second outbreak, using virulent blood fortified by vesicular lymph and epithelium, there were inoculated 261,000 cattle, thus making a total of over one million cattle handled in the two outbreaks.

(2) It is the first time that aerial transport to combat animal disease has been used to such an extent in the fight against animal disease. Aeroplanes were not only employed to transport officials and virus supplies to outlying districts, but also for dropping virus supplies in the swamp areas by parachute—where landing by plane was impossible.

(3) The complete success of the scheme is noteworthy. It is now two years since the second outbreak was dealt with, during which time there has been no recurrence.

One knows that in South Africa the disease shows itself in a mild form, and in this instance only two types of the strain were dealt with. Nevertheless, the veterinary staff were very often working under adverse conditions—sometimes in desert country and sometimes in swamps—and generally some 300 miles from the nearest railway or telegraph line.

The fact that embargoes were removed shortly after the inoculation and that the country has had free export since then proves that neighbouring territories realised that the energetic measures adopted were effective.

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General Articles

A PRELIMINARY NOTE ON SO-CALLED "DRY DISTEMPER" OR "INFECTIOUS BROWN MOUTH" OF THE DOG.

By L. P. PUGH, B.Sc., F.R.C.V.S.
Sevenoaks, Kent.

THE term " distemper " is widely used to describe illnesses in dogs in which a variety of symptoms are found. The brilliant work of Laidlaw and Dunkin, published in 1926,* proved definitely that an ultra-visible virus was the cause of much illness in dogs, termed distemper, and that dogs could be immunised against the virus. The methods of immunisation worked out by them have been practised in this and other countries for a number of years, and the results have apparently been highly successful. Occasionally, however, alleged breakdowns occur. While one was prepared for a certain margin of failure which might arise from one of several causes, especially in methods in which a living virus is being used, it seemed more than coincidence that the symptoms described below should occur in immunised dogs in widely separated districts and immunised at different times by different methods, which in our experience had proved so highly successful elsewhere, and should be considered a true " virus " distemper.

Exposure of ferrets in infected kennels was carried out on several occasions, and the failure of these animals to develop clinical symptoms of distemper virus infection confirmed the suspicion that the illness in the affected dogs was something other than true virus distemper infection. It was at this stage that laboratory experiments were carried out at the Wellcome Physiological Research Laboratories with the material obtained from a kennel in which this disease was present. It seems from the results of these experiments that the condition referred to as " dry distemper " or " infectious brown mouth " of dogs may be something different fromcanine distemper virus infection. It will be necessary to carry out further observations, especially in the laboratory, before the true cause of " dry distemper " is established, but the evidence at present suggests that it may be an ultra-visible virus somewhat different from that responsible for true canine virus distemper.

This paper deals with the clinical aspects of the condition with a note on the laboratory findings in one outbreak. The condition has been observed in the following circumstances : (*a*) As epidemics in kennels of dogs immunised against virus distemper by the Laidlaw-Dunkin methods ; (*b*) as an outbreak in a kennel of non-immunised dogs ; (*c*) as isolated cases ; (*d*) as a so-called severe reaction following injection of canine distemper virus in the process of immunisa-

* *Jour. Comp. Path. and Therap.*, 1926, Vol. xxxix.

tion into dogs which are already in the early stages of the infection. The disease has been recognised in dogs of all ages. Immunity to distemper, whether naturally or artificially acquired, appears to bear no relationship to the occurrence of the condition.

Symptoms.—The disease occurs in three forms: subacute, acute and chronic types (the subacute type is dealt with first because it is most frequently observed in practice). It should be pointed out that in all probability the clinical picture is dependent largely on the action of secondary invaders, as is the case in true distemper virus infection.

Subacute Type.—In actual practice this type constitutes the majority of observed cases, as seen in epidemic and endemic form in large kennels. The onset of the disease is sudden, with a high temperature (105°–106° F.) lasting usually about two days. There may be a little vomiting, but it is seldom severe. There is commonly a slight cough, and examination of the throat will frequently reveal a definite tonsillitis, in others the pharynx is inflamed. After this primary rise of temperature there is a sharp drop to nearly normal, and the animal appears considerably better and commences to feed again. It is rather characteristic of this type of the disease that affected animals often continue to feed quite well, especially on meat, during the first ten days or so, in spite of the fact that they are obviously losing body weight.

Examination of the appended temperature charts of a few clinical cases will reveal that there is a secondary rise of temperature simulating that seen in distemper, but as a rule the general range of temperature is not so high as in the latter disease. The febrile course is often very protracted. It is during the secondary febrile phase that the characteristic brown mouth is developed. Examination of the molar teeth, both inside and out, will reveal the presence of a brown slime, which is quite easily removed by rubbing the teeth with dry cotton wool. At the same time very slight pressure on the edges of the gums will cause them to bleed. One can clean up a mouth thoroughly in the morning, and by the afternoon the teeth will be covered again with the same material. If neglected, the mucous membrane of the mouth overlying these dirty teeth, as well as the gums, tends to become necrotic, and in a proportion of cases they emit an offensive odour.

During the early phase of this disease the bowels appear normal or slightly constipated, but during the second febrile stage, especially about the tenth day, varying degrees of diarrhœa set in, with or without some blood and mucus in the motion. With the onset of diarrhœa the appetite usually becomes more capricious. The conjunctivæ become injected, and a small amount of purulent secretion tends to accumulate at the inner canthus, more especially in those cases showing marked wasting. As opposed to the acute form, there is not much tendency to develop a nasal discharge, although a thin yellowish discharge is seen in cases with a severe pharyngitis. For this reason the term "dry distemper" is sometimes applied to this form of the disease.

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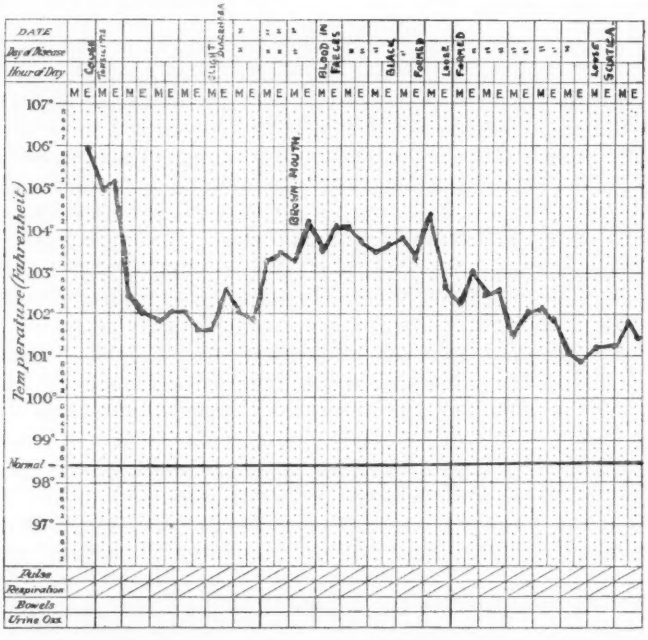
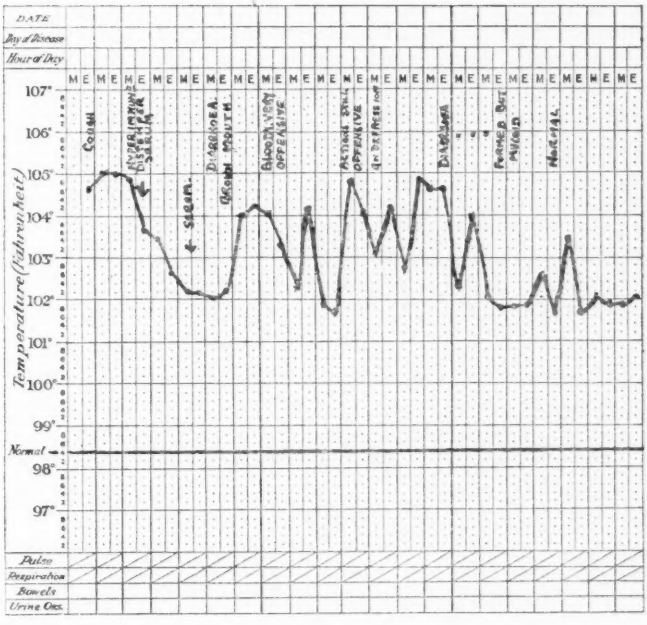
In most outbreaks of any size one will usually encounter a case or two of profound jaundice of a very fatal nature. There is invariably a marked wasting of the body muscles, especially noticeable in the lumbar and orbital regions. Observation, even in the mildest of cases, will reveal involvement of the nervous system. Many of the so-called " hysteria " cases alleged to have been followed by distemper have on investigation proved to be due to " infectious brown mouth." Such affected animals often waste slowly, and ultimately develop obvious encephalitis and are destroyed.



Alsatian, aged 12 months. (Immunised at six months, vaccine-virus method.)
Disease: Dry Distemper (Brown Mouth).

The clinical nervous phenomena seen during an epidemic include acute neuritis, especially sciatica and lumbago, various forms of paraplegia, convulsions, and, in the more prolonged febrile cases, chorea. Even in dogs showing no obvious nervous symptoms, the general depression and sleepiness of the majority of cases would suggest the presence of profound headache. Ultimately it may be shown that the latter is really due to nervous involvement. In this type most of the fatalities are brought about by the involvement of the nerve centres. The enteritis which is frequently present is not usually severe enough to bring about a fatal termination on its own account.

Acute Type.—In this form the onset is sudden, temperature is very high and vomiting is rather severe. There is the same temporary improvement associated with the fall of temperature. A few days later the temperature will shoot up suddenly, vomiting recurs, and acute offensive diarrhœa supervenes with a rapid fall of temperature to subnormal. There is marked thirst, but any attempt to administer liquid foods is resisted strongly, as though the throat (which is always inflamed) gave great pain. The teeth rapidly become coated in slime, and there

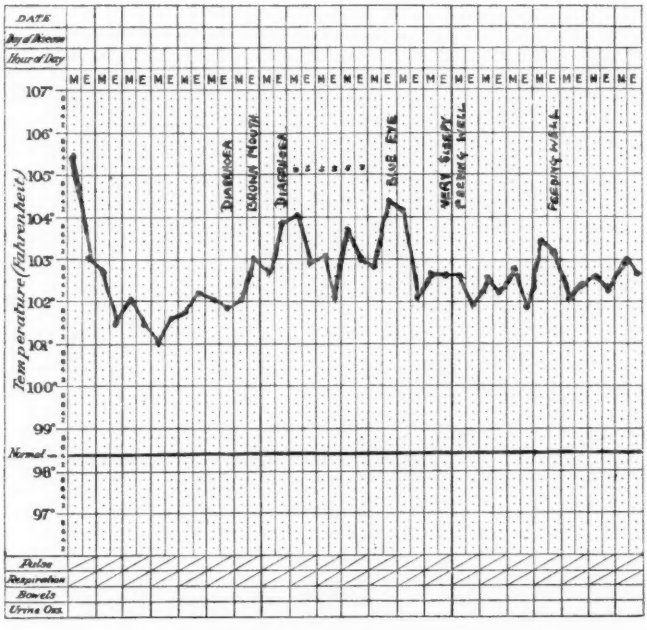


Hound Pup, aged 3 months. Diagnosed as distemper; no response to serum. Re-diagnosed Brown Mouth.

is a tendency for the gums and even the tip of the tongue to become necrotic (such as has been described in Stuttgart disease). The mouth gives out a very offensive uriniferous odour. Death may take place within a few days, the dog passing into a comatose state, with the liquid fæces dribbling away from the anus. In those that live longer, the conjunctivæ become very congested, central corneal ulcers may develop, a hæmorrhagic purulent nasal discharge may appear, and death occurs usually from involvement of the nervous system. In one outbreak of the acute type in a kennel of distemper-immunised dogs, numbering twenty-three, there were ten deaths: five from acute enteritis and toxæmia; two

from pneumonia ; two acute encephalitis ; one chorea. Of the others, fourteen had septic mouths, and four perforating corneal ulcers.

Chronic Type.—In kennels in which the disease has been more or less endemic, one finds in addition to cases of the subacute type a number of puppies and young adults that will not thrive in spite of a good appetite. Examination of their throats will reveal inflamed tonsils. At the same time the teeth, although not covered in movable slime, will present an appearance of dirtiness—they lack the lustre



Mongrel, approx. 2 years. Disease: Dry Distemper. Destroyed during sixth week owing to recurrent convulsions.

usually associated with young healthy teeth. The unthriftiness will last sometimes for months, and may ultimately ruin the value of the dog by retardment of bodily growth. There is also permanent damage done to the teeth which goes against a dog in the show ring. The majority ultimately recover ; the others usually develop nervous phenomena, such as recurrent fits or hysteria, and are destroyed.

Post-mortem Findings.—A great variety of pathological changes are found in the acute type, due to hæmorrhagic effusions into most parts of the body, especially the cavities. Enteritis and enlargement of the mesenteric glands are the commonest macroscopical lesion. The kidneys are almost invariably con-

gested in the acute cases, and their involvement would appear to have some connection with the development of the severe mouth lesions. Pneumonia is not frequent and jaundice is found only occasionally.

Discussion.

Although convinced for some considerable time that there existed a disease in dogs simulating, but distinct from, canine virus distemper, it was not until this year that experimental evidence was forthcoming. The material for investigation was procured from dogs in a kennel in which the entire population (twenty-three dogs) became rapidly affected with "dry distemper." All had been immunised against distemper by the virus-serum method. The immunisation had been carried out over a period, puppies being treated as they reached the age of three months; thus several different batches of material had been used in the kennels, yet every dog became affected. The failure to recover canine distemper virus in this outbreak, together with the fact that exposed ferrets in other outbreaks failed to develop clinical distemper, led to the conclusion that there exists a disease affecting dogs, and whose symptoms simulate canine virus distemper, apart from that caused by the true canine distemper virus. This finding may throw some light on the so-called "breakdowns" in immunised dogs, and may further account in some measure for the histories of second attacks of distemper in dogs which are recorded from time to time.

In one outbreak investigated by laboratory methods the true canine distemper virus was recovered, and it was therefore only on clinical evidence that dry distemper was diagnosed in addition to true virus distemper. It is interesting to note that in the acute form of dry distemper the mouth picture is very similar to that found in so-called Stuttgart disease. This, however, does not apply to the subacute form, which constitutes about 90 per cent. of the cases observed.

Summary and Conclusions.

A disease affecting dogs of all ages is described under the term "dry distemper" or "infectious brown mouth" of the dog.

It is characterised by fever, tonsillitis, the development of a characteristic brown slime on the molar teeth, bleeding and superficial necrosis of the gums, nervous involvement varying from a simple neuritis to encephalo-myelitis and enteritis of various degrees of intensity.

The disease does not appear to be associated with canine distemper virus, because: (*a*) Dogs recovered from naturally occurring distemper are still susceptible; (*b*) dogs immunised against virus distemper are susceptible; (*c*) ferrets exposed in affected kennels and brought into close contact with infected dogs in all stages of the disease remain healthy; (*d*) from typically affected dogs the canine distemper virus was not recovered.

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NOTE BY T. DALLING, M.R.C.V.S.

Wellcome Physiological Research Laboratories, Beckenham, Kent.

Collaboration has been made with Major Pugh in the investigation of the disease of dogs which he terms " infectious brown mouth " or " dry distemper." Material from two outbreaks was used in laboratory experiments, and in one we were unable to obtain any evidence of the presence of canine distemper virus. The second outbreak was, unfortunately, complicated by the presence of true distemper virus, as shown by the development of typical clinical distemper in exposed and inoculated ferrets. One of the surest tests of to-day for the diagnosis of the presence of canine distemper virus is the exposure or inoculation of susceptible ferrets, and this test was employed in the above outbreaks. In addition, dogs, susceptible and immune, were also exposed to infection; and when a febrile reaction occurred a sample of their blood was injected into ferrets.

Without recording details of the experiments (they will form the subject of a future communication), the results in the first outbreak were:

(1) Emulsions of tissues from typically affected cases failed to infect ferrets susceptible or immune to canine distemper virus, though kept under observation for considerable periods; the susceptible ferrets still reacted typically when injected later with canine distemper virus.

(2) Dogs susceptible or immune to canine distemper virus injected with emulsions of tissues of affected dogs showed a febrile reaction somewhat simulating that produced by canine distemper virus. Blood taken from these injected dogs at the height of the febrile reaction failed to produce symptoms in ferrets susceptible to canine distemper virus. Dogs susceptible to distemper virus and injected with material from the above outbreak proved, on recovery from the effects of the injection, still to be susceptible to distemper virus.

Unfortunately, the second outbreak (in a foxhound kennel) was complicated with true canine distemper, as shown by the result of ferret inoculations; the foxhound puppies had not been immunised.

From the above experiments it would appear that the first outbreak was unassociated with the presence of canine distemper virus. There is distinct evidence that there may be another virus which causes some outbreaks of distemper in dogs. Our work on this subject has extended over a considerable period, and is still in progress. We hope to publish an account of this at an early date.

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AN INOCULATION CAMPAIGN AGAINST FOOT-AND-MOUTH DISEASE.*

History and Occurrence.

EARLY in May, 1934, foot-and-mouth disease was discovered in a herd of cattle, about 300 in number, trekking eastwards from Maun, N'gamiland. A "standstill" order was immediately imposed, and after confirmation, neighbouring administrations were informed. An intensive inspection set on foot showed that active disease existed at distant parts of a very large area of the north and north-west portions of the territory. Before the end of May fresh active disease was found to be present in and around (*a*) Botletlie River area (Rakops to Maun, (*b*) Ghanzi area, (*c*) Chobe River area (Kachikau to Kasane), and infection had been present, but had apparently died out, in and around the area lying north and north-west of Lake N'gami. The oldest infection, judging from separation of the hoof, lay west of the Okovango Swamps, 60 to 100 miles north of Lake N'gami. Cattle movements were traced to have taken place from the lake to all the places where active disease was present.

Plan and Sequence of Campaign.

The limits of the outbreak having been defined, a cordon far distant from infection was laid down, enclosing the infected area, and a cattle-free belt extending from 30 to 100 miles wide, separated the cordon from the clean territory.

On account of the wide distribution, and many centres of infection of the disease, it was decided to adopt the same course as that taken in the 1933 outbreak and inoculate all the cattle in the infected area within the cordon, thereby hurrying the disease through this area as quickly as possible. The reasons for adopting this plan lie in the considered facts that the immunity resulting from infection by inoculation is strong enough in the vast majority of cases to resist reinfection, and the danger of the disease becoming endemic through allowing it to "smoulder" is reduced.

Other courses of action considered were: (*a*) To ignore the outbreak with consequent paralysis of trade, due to neighbouring embargoes, and the danger of the disease becoming endemic from continuously occurring subsidiary outbreaks. This would be resented by neighbouring states, who would probably have to maintain continuous and expensive cordons.

(*b*) To quarantine within a cordon without inoculation and hope that the disease would die out. Here, again, is the danger of the disease becoming endemic on account of the large numbers of cattle and the extensive area involved.

(*c*) Shooting out. This method was impracticable because the infected areas were too heavily stocked.

(*d*) To inoculate the whole territory without cordons, which would undoubtedly be resented by neighbouring territories for the same reason as in (*a*).

None of these latter courses therefore were thought reasonable or advisable.

* From the Report of the Chief Veterinary Officer of the Bechuanaland Protectorate, 1934.

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Speed of operation was recognised as an essential factor in the campaign, as climatic difficulties associated with the rainy season would render the campaign in the area to be inoculated extremely arduous, if not impossible. A plan of campaign was adopted, and stock inspectors were sent out to erect crushes at selected sites and await the arrival of inoculum. It was estimated that the operations would be completed in October.

Virus was obtained on May 21st from an infected herd near Makalamebedi, on the Botletlie River, and further supplies were obtained from tests made at Maun, on May 28th. Inoculation commenced on the Chobe River at Kabullabulla on June 29th, and on the Botletlie River early in July, inoculum in these two cases being obtained locally. By the middle of July a sufficient number of crushes had been erected throughout other parts of the infected area to proceed rapidly with the inoculation on a large scale, all inoculum supplies being issued from the main inoculum production station at Maun. The campaign was completed twenty miles south of Siambisso on September 24th, and the total number of cattle inoculated was 261,774 head.

It had been foreseen that the delivery of inoculum throughout the infected territory, a vast area of 60,000 square miles, would be difficult, and to overcome this an aeroplane and three 1½-ton motor lorries were brought into service to distribute inoculum at regular intervals when and where required.

Eight landing grounds were prepared at Rakops, Makalamabedi, Maun, Ghanzi, Tsau, Nokanen, Mohembo, and Kachikau, but it was found that these were insufficient for delivering virus for the whole of the inoculation area, and a system of dropping inoculum by parachute was tested out and instituted to supply the more inaccessible parts, particularly in the swamp area of the Okovango delta.

Too much stress cannot be laid upon the success of the aeroplane in this direction. It can be safely estimated that the campaign was shortened by at least two months through its use. For instance, 6,000 doses of inoculum were delivered twice weekly to the Ghanzi area, 200 miles away from the inoculum production station, and sufficient inoculum was supplied to the swamp areas to keep the inoculation in full swing.

Altogether 86,000 doses of inoculum were delivered by the aeroplane at various landing grounds for local distribution, and 6,000 doses by parachute. The parachutes were simply constructed; the area of parachute per lb. weight of load was calculated for models. It was found that approximately 7 sq. ft. of parachute was required for each 1 lb. weight of load, *viz.*, 91 sq. ft. for one gallon tin of inoculum, about 11 lb., and 144 sq. ft. for a two-gallon tin, about 22 lb. The parachute consisted of a square piece of calico, the required area, the four corners of which were firmly tied to four stout strings of the same length exactly, *viz.*, about 12 ft., and the tin of inoculum was tied to the free ends of the four strings. The parachutes were folded in a certain manner, with the strings carefully arranged to prevent tangle, and were thrown out of the open door of the cabin of the plane from a height of 500 to 800 feet, when

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gliding into wind. Including tests, over twenty parachutes were dropped altogether without a single failure.

Method of Inoculation.

Two methods of inoculation were available : (*a*) Intranasal inoculation, (*b*) subepithelial inoculation of the tongue. Intranasal inoculation was decided on as the most practicable under the circumstances, since the tongue inoculation would prolong the campaign by several months. The inoculum used consisted of blood virus fortified with finely macerated lesion (epithelium lymph) virus obtained from active lesions.

Description of the Intranasal Inoculation.—The animals to be inoculated are driven into a crush or race, and a dozen native helpers supplied with specially constructed twitches, suitable for the purpose, draw the heads to one side by affixing the twitches over both jaws, fairly far back, so that the nostrils are left open. By lifting the head the nostrils are raised, and the inoculation of 2½ c.c. of inoculum downward into each nostril from a 20 c.c. syringe, with a stop on the plunger shaft, is very simply carried out. The animal is held by the twitch until it has been branded on the left cheek with a distinctive brand and is then released. Under good conditions, *viz.*, with a good team of helpers and a good crush, an electric prodder and tractable cattle, it is quite possible for an active inoculator to inoculate 1,500 head of cattle a day. The features of the intranasal inoculation are simplicity and speed, whereas the sub-epithelial tongue inoculation is slow, and requires some expert technique.

Activities of the Inoculum Production Station.

The selection of Maun as the inoculum production station and headquarters had several advantages : (*a*) Maun was more or less the central point of the infected area. (*b*) Passable roads radiated in several directions suitable for communication with the outside staff in areas to be inoculated. (*c*) Being the capital village of the Batawana tribe, co-operation with other administrative departments and the Chief of the tribe was facilitated.

The purposes of the Inoculum Production Station were to produce, maintain and distribute a regular supply of inoculum, and to organise the despatch of staff to the various inoculation areas.

The Production of Inoculum.—This entails : (*a*) preparation of sterile preservative medium ; (*b*) inoculation of virus reservoirs ; (*c*) selection of virus donors ; (*d*) preparation of inoculum ; (*e*) treatment of inoculum up to, during, and after delivery.

(*a*) *Preparation of Sterile Preservative Medium.*—The materials and the proportions used in the preparation of sterile preservative medium were : glycerine, 12 oz. ; sodium chloride, 8.5 grms. ; sodium citrate, 15 grms. ; water, 1,000 c.c. per Winchester quart. The glycerine, sodium citrate, and sodium chloride were added to 1,000 c.c. of boiled water in sterile Winchester quart bottles, fitted with sterile corks. Sterilisation of Winchester quart bottles was undertaken

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by an arrangement of wire hangers supporting the bottles in a 44-gallon drum which would take sixteen bottles at a time.

(*b*) *Inoculation of Virus Reservoir.*—Usually from fifty to one hundred and fifty head of cattle constituted the virus reservoir. These animals were supplied by the various traders and natives of the Maun district. For the purposes of inoculum production, finely-macerated lesion virus was injected into the submucosa of the epithelial layer of the tongue.

Description of the Tongue Injection.—Standing to one side of the operator, an assistant " noses " the animal, while another assistant withdraws the tongue, holding it firmly towards the tip in his right hand with the thumb on the upper surface, and the tip of the tongue being bent downwards to remove his thumb from the plane of the syringe. The injection is made through a fairly large bore needle, which permits the passage of any small epithelial particles, such as conical papillæ, which may be present in the inoculum. The needle is run under the epithelium for a distance exceeding one inch, having the opening of the hypodermic needle uppermost. When the needle is introduced to the required limit, the left hand thumb is placed on the base of the needle, where it enters the epithelium, and the syringe and needle turned through 180 degrees, so that the opening of the hypodermic needle is now underneath. Inoculum is injected until an obvious bleb or definite underrunning of the epithelium by the inoculum is observed to have taken place, *viz.*, usually about ½ c.c., which amount can be controlled by the plunger shaft stop. (The purpose of turning the syringe through 180 degrees is for greater control in introducing the needle, and also in making the injection. With the mouth of the hypodermic needle opening downwards there is less risk of bursting the epithelium with the injection.)

The left thumb is kept pressed on to the surface of the tongue while withdrawing the needle, in an attempt to occlude the hole made by the needle, thus preventing the inoculum from running out. The operation is repeated *via* two or three places in the same approximate horizontal, thereby producing a very extensive lesion by confluence of the resulting lesions, and an ample supply of lesion virus is obtained after twenty-four hours.

The " needletrack " method of inoculation does not produce such extensive lesions, and consequently does not produce such large amounts of lesion virus as this " bleb production " or " underrunning " method. It is important to select a site for the track of the needle, free of fungiform papillæ and fractures in the continuity of the epithelium. These papillæ and fractures cause leaks of the inoculum. Faulty inoculations into the musculature of the tongue often produced abscesses at the site of inoculation. Twenty-four hours after the tongue inoculation the reservoir was examined for the purpose of re-collecting virus.

The Collection of Epithelium/Lymph or Lesion Virus.—For the purposes of inoculum production these materials were collected only from the mouth. The apparatus used was a scalpel, a pair of sharp scissors, a pair of dissecting forceps

and a number of dark glass tubes, about 25 c.c. capacity, fitted with corks, al sterilised by boiling.

After carefully withdrawing the tongue, vesicle fluid or lymph was collected from unbroken vesicles by pricking the vesicles with the scalpel and allowing the vesicle fluid to run into the test tube. By pressing the vesicle all the available lymph was obtained. (This method is superior to the suction of lymph through a needle into a syringe, as in the majority of cases the needle becomes blocked by the epithelium and much lymph is lost *via* the puncture hole made by the needle.) Next, all the free epithelium was removed with the forceps and scalpel or scissors, and if necessary the lesion was scraped with the back of the blade of the scalpel, to obtain the fibrinous matter which often lines the base of the lesion. These materials were transferred to the sterile test tubes.

Maceration was carried out by grinding the lesion virus in a pestle and mortar with sterile sand, using a little preservative medium as a lubricant and diluent until no particles larger than the conical papillæ could be observed. No accurate standardisation of the lesion virus was undertaken. The resulting material constituted the fluid for fortifying the blood virus, and when diluted to reasonably liquid proportions with preservative medium, constituted the inoculum for the tongue injection. Such stores of virus were kept cool and in the dark, and would remain infective for at least seven weeks.

Attempts at filtering this macerated lesion virus to free it of large particles, consisting mainly of small hard conical papillæ from the tip of the tongue, proved unsatisfactory, and as there was no great necessity for filtering, provided that a fairly large-bore needle was used for the tongue injection, filtering was dispensed with.

Selection of Blood Virus Donors.—The system of selection adopted was that of the 1933 campaign, and was associated with certain criteria suggested by Bevan, *viz.*, the presence of pyrexia, consequent upon infection by the tongue inoculation, either before or together with evidence of generalised lesions about to commence either in the feet or in the mouth. Other symptoms bearing on the selection were general appearance and lachrymation, which was observed to occur very commonly in animals selected. It was also observed that large unbroken *tense* secondary vesicles often accompanied cases with highly-infective blood. At Maun generalisation occurred from twenty-four hours to ninety-six hours after a tongue inoculation, but usually about the forty-eighth hour. The percentage of cattle showing generalised infection, following upon the tongue inoculation, varied between 25 per cent. and 45 per cent. with different reservoirs.

Early Evidence of Generalisation.—(1) Elevation of the temperature. (2) Signs of commencing generalised lesions. The first signs of lesions commencing in the feet were usually seen as a slight puffiness and heat of the epidermis of the inter-clavian cleft, and sometimes sweating was observed at the site. The sweating no doubt arose from inflammation prior to vesicle formation ; more rarely the lesion presented itself at some other point of the claw, *viz.*, the heel or the quarter.

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About twelve hours after this "puffing" vesicles arose, and later erupted. Lesions commencing in the mouth were often difficult to discern, especially when pigmentation would hide them. In the early stages when associated with the mucosa of the gums, cheeks, frænum or labia, they might be distinguished as pink inflammatory patches that would tend to become detached when scratched with the finger-nail. Later on these lesions took the form of a superficial necrosis, turning brown in colour. On the tongue itself vesicle formation was heralded by a faint blanching and thickening of the epithelium, and the finger-nail or scalpel would separate the epithelium from the muscle layers below. No free vesicle fluid would be present at this stage.

Preparation of Inoculum.—The selected animal was cast, secured, and bled from the jugular vein. The skin was cut through over the jugular vein after washing the site, and a sterile large bore cannula inserted into the vein. Approximately 1,250 c.c. of blood was run into the Winchester quart bottles containing preservative, through sterile rubber tubing attached to the cannula. Dust was prevented from entering the neck of the bottle by cotton wool. From 4,000 c.c. to 10,000 c.c. of blood was taken at each bleeding, depending on the size of the animal. Fortification of the blood-virus was carried out by adding 5 c.c. of macerated lesion virus to each Winchester quart. The bottles were then placed in paraffin or petrol cases, suitably packed with water-soaked packing, and placed in a cool, shady place. Delivery was undertaken as soon as possible, and in transit the bottles were kept shaded and cooled with water. After delivery the bottles were buried in damp, shady ground until required for use. Supplies were usually used within seven days of issue.

Observations and Experimental Work.—Some of the interesting observations associated with the natural disease and with a number of experiments conducted in cattle and sheep are worthy of record, although the pressure of field work and the doubtful susceptibility of the cattle used for the experiments, since they were taken from areas which had been infected, served to handicap this work and the satisfactory interpretations of it.

(*a*) Although virus is present in the blood to some degree, in the majority of cases showing pyrexia just previous to generalisation, or together with generalised lesions, the infectivity of blood virus taken from different donors varies. In one case the blood may prove highly infective when inoculated intranasally, whilst in another case infection may be disappointing, and yet the symptomatology would suggest that one case should be as infective as the other. To ensure adequate infectivity the blood virus from several donors could be mixed, but this method is clumsy, and fortification of the blood virus by macerated lesion virus was considered superior.

In the early part of the campaign the infectivity of the blood virus taken was tested by tongue inoculations on the same day as it was obtained. Usually three test animals were used. The size of the lesions produced twenty-four hours after inoculation being accepted as an indication of the degree of infectivity of

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the sample. Sometimes a sample did not produce reaction in any of the test animals, and the inoculum was therefore discarded. Later, owing to test animals becoming scarce and the uncertainty of susceptibility of these test cattle, it was proved that fortification provided adequate infectivity, and this testing practice was discontinued.

At times a very virulent virus would be obtained from an individual, and such a virus would produce infection by intranasal inoculation in a shorter period than usual. This observation suggests that a particular individual might be responsible for alterations in the virulence of the virus. Actually the virulence of the virus remained substantially constant throughout the campaign, apart from these comparatively rare exaltations. If kept in dark glass test tubes packed in wet cotton wool, lesion material would still prove infective after a period of seven weeks, either in the presence of a minimum of preservative or even without preservative. It was noticed that in the absence of preservative a considerable amount of heat was generated from the lesion material. When diluted with preservative, virulence might be considerably reduced in three weeks or so. Passaging of the virus did not seem to increase its virulence, except in such cases where the virus may have been kept for some time diluted in liquid preservative. thereby possibly becoming attenuated. Three or four passages would then restore the virus to its original virulence.

(*b*) Numerous inspections of the cattle inoculated intranasally showed that the percentage of infection obtained from the intranasal inoculation with the inoculum issued varied between 10 per cent. and 40 per cent., whilst a further 10 per cent. to 20 per cent. infection by contact would usually occur some ten days later. In many instances it appeared that native stock were more resistant to infection and the effects of the disease than improved stock.

(*c*) It was observed that infection would usually occur between the eighth and tenth days after inoculation, and more rarely between the fourth and sixth day after inoculation. " In-contact " infection usually occurred between the tenth and sixteenth days after the original infection.

(*d*) Observations on different virus reservoirs indicate that the reaction by native cattle to a tongue injection of 1934 virus varies with different animals and, moreover, this variation in reaction is fairly constant. Some animals show local reaction only. Some show generalised reaction, and some animals show no reaction at all. Roughly one-third of the total was represented by each class.

Types of Reaction.—(1) A small single local lesion at the site of inoculation with only sufficient " spread " away from the needle track to indicate that the tissue was affected, and no confluence with adjacent inoculation sites occurring. (2) A large single local lesion involving one to six quare inches of the epithelium of the tongue, caused by the confluence of the lesions arising from adjacent inoculation sites, but no visible generalised lesions in the feet or the tongué resulting, although possibly secondary lesions might occur on the tongue as a result of direct infection of small wounds in the epithelium of the tongue by

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vesicle fluid leaking out from the primary lesion. Some pyrexia might or might not occur. (3) A large single lesion as in (2) with secondary lesions in the mouth and feet of a generalised nature, with or without pyrexia being registered. (4) More rarely a type of lesion was seen which could be described as a "furring" or spreading superficial erosion of an area of epithelium, without penetration of the full depth of the epithelium. This type of lesion might occur locally at the site of inoculation or with the generalised disease, and was sometimes associated with the natural disease, occurring most commonly towards the tip of the tongue where the epithelium is thickest. (5) Some animals showed no reaction whatever, except perhaps the marks of the needle tracks or the bleb.

Types (1) and (5) usually occurred in about one-third of the number of animals constituting the reservoirs. These animals were of no use in the production of the inoculum, and were regarded as insusceptible to foot-and-mouth disease, although signs of previous infection could not be shown in most of these cases. When re-inoculated these animals rarely showed any marked difference of reaction, which eliminates the possibility of faulty technique in the injection preventing infection. It is easy to assume that these animals were immune due to a previous attack of the disease, but it is certain that many of these animals had never before been in contact with the disease, and resisted infection by the tongue injection naturally.

Reaction types (2) and (3) each formed about a third of the total, and were used as a source of lesion virus twenty-four hours after the tongue inoculation, and kept under observation for the production of blood virus. Animals in (3) formed the class from which blood virus was derived. Not all these cases, however, showed pyrexia, in fact a large proportion failed to do so, that is, at a time when temperatures were taken. Temperatures were usually taken at about 11 a.m. and 3 p.m.

The average temperature of a virus reservoir in the morning during winter at Maun, forty-four hours after the tongue inoculation, was 101.7° F. and at the sixty-eighth hour 102° F. In the afternoon, forty-eight hours after the inoculation, the average temperature was 104.7° F., and seventy-two hours after inoculation 103.5° F. Normally the average temperature of uninfected cattle at Maun during winter in the morning is 100.2° F., and in the afternoon 101.6° F. Temperatures of over 104° F. in the mornings and 107° F. in the afternoons were very rarely registered.

Experience showed that the height of pyrexia associated with generalised foot-and-mouth disease usually lasted but a few hours, and many cases suitable for the production of blood virus may have been lost overnight, or at some time when temperatures were not taken. Sometimes pyrexia persisted for forty-eight hours, but usually when generalised lesions cropped out the temperature dropped within a few hours.

It was noticed that usually the higher the pyrexia, the more infective was the blood, *viz.*, blood taken at 106.4° F. should prove more infective than that at

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105.4° F.; but this was not always so, and blood taken at 105° F. might prove more infective than that taken at 107° F. It was also noticed that blood from improved cattle would usually prove more infective than that taken from native cattle.

(*e*) Opportunity was afforded for observing the immunity resulting in cattle which showed adequate signs of having had the disease, *viz.*, separation of the hooves, and scars of old lesions on the tongue. Such animals almost entirely resisted infection by the tongue inoculation, showing at the most a slight local reaction. [*See* type lesion (1) and (5)].

A very small percentage of reactors, however, less than 1 per cent., which undoubtedly showed definite signs of previous infection from four to six months old, reacted locally, and generalised subsequent to the tongue inoculation. Although the percentage is low, the number of these cases met was sufficient to indicate that the immunity resulting from an attack of foot-and-mouth disease would in a few cases break down within six months and leave animals susceptible to reinfection by the tongue inoculation. It might be considered, however, that the method of infection is a severe test for the immunity to withstand.

The possibility of a mutation of type or variety of type of virus causing the breakdown in the immunity in these cases cannot be completely overlooked, and yet it is difficult to understand why such a few cases should break down; if mutation of the virus was the cause, a greater number of breakdowns would be expected. In most cases a strong immunity capable of resisting reinfection locally, and generally by natural infection, or even a tongue injection of virus, resulted from infection. It is also contended that all animals were not susceptible to the disease, and these would not be infected by natural or artificial means with this particular virus.

(*f*) Some unusual cases were observed. A few cases showing previous signs of infection registered pyrexia at about the forty-eighth hour after the tongue inoculation, but no generalised lesions occurred. The pyrexia may have been due to some antibody-antigen reaction in the blood or to some outside cause. One case worthy of mention is a non-reactor locally to the tongue injection, which showed pyrexia after twenty-four hours for the next seventy-two hours, and then lesions occurred in one foot, but not in the mouth.

(*g*) Several opportunities were afforded to observe the amount of natural infection that would occur in native cattle by in-contact infection. Apparently clean animals were kept at different times with the virus reservoirs, and examined daily for signs of disease, and it was observed that only 10 per cent. to 20 per cent. became infected up to the sixteenth day, and infection in these cases was never recorded before the tenth day. The non-reacting in-contacts were usually used after the sixteenth day for virus production and then proved to react in the usual proportion, showing that animals susceptible to the tongue injection would not necessarily contract the disease naturally within sixteen days of "incontact" conditions.

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In the field natural infection was observed to be slow, unless some unnatural factor such as trekking was present, and trekking would shorten the incubation period, increase the amount of infection and the severity of the disease. Observations suggest that by far the most important factor known bearing on the general dissemination numerical infection, severity of disease, virulence of virus, and even the origin of outbreaks, is the trekking of cattle over long distances. The explanation lies either in the cattle or in the virus, or both, *viz.*, cattle become more susceptible, or the virus becomes more virulent, or a combination of these factors; in fact it is possible that to produce widespread and heavy infection under Bechuanaland conditions, some factor besides the virus, associated possibly in some way with the trekking of cattle, is necessary, *viz.*, irritation of the feet from walking, produced by small wounds arising in the cleft, from the thorns and grass seeds.

(*h*) The actual lesions of foot-and-mouth disease in native cattle in Bechuanaland are indistinguishable from those in European cattle in Europe. The difference lies mainly in the effect of the disease on the cattle and the infectivity of the virus. In the 1933–34 outbreaks in Bechuanaland the disease was mild, the symptomatology was not exaggerated, and no mortality occurred as a result of the disease. Obvious constitutional symptoms were rarely exhibited, even in animals with extensive lesions.

Lameness is rare, except in animals on trek, but may be observed for a short period only in infected cattle early in the morning after the animals have been lying down, but foot lesions in the hind feet might be accompanied by a kick or double kick, ending in a shake of the foot. During wet weather, however, lameness of a more or less severe character affecting up to 10 per cent. of the adult cattle in a herd, may be observed owing to secondary infection developing in open foot lesions. Usually rumination is not interfered with, even when there are extensive lesions in the mouth, but it was observed to cease temporarily in some cases. A sweet necrotic odour may be perceived when standing in a kraal of badly-infected cattle, and this smell is very noticeable in samples of lesion virus.

A descriptive point in regard to the mildness of the disease is that native herd-boys or cattle owners were asked if they could observe anything wrong with the cattle when there was a 30 per cent. to 50 per cent. infection in the herd, and the reply was that the cattle "was quite well." The power of observation of the Bechuana native, where his cattle are concerned, is fairly good, and this lack of recognition of the disease shows that symptoms are not so apparent as are classically described in text-books or articles written in South Africa.

European settlers and traders with life-long experience of handling cattle were often genuinely surprised when on inspection disease was demonstrated amongst their herds after inoculation. The only sequel, as far as can be observed, is separation of the hooves, which is of no consequence except as a means of estimating the length of time which has passed since infection. Separation was most commonly observed in the front of the claw and at the heels, and more

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rarely the quarters of the claw were affected. Casting of the hoof was not observed. In connection with the separation of the hooves being adjudged a sequel of foot-and-mouth disease, other causes of separation had to be borne in mind. Of these, direct injury could usually be easily differentiated, but cattle which had walked over hot burnt veldt would show lameness and extensive separation at the heels as a result very similar to foot-and-mouth lesions. The absence of any mouth lesions, and burnt veldt in the neighbourhood, would enable a differential diagnosis to be made in these cases. With regard to the infectivity of the virus: the amount of natural infection is usually low in comparison to European conditions, unless some unnatural factor is present; the incubation period is also longer. The disease will pass through a herd, die out, and many susceptible cattle will escape infection.

Experimental Work.—(1) With the object of facilitating the campaign, an attempt to infect the cattle by spraying the heads with inoculum was undertaken on the assumption that the infection would occur by inhalation of the atomised inoculum. A quantity of intranasal inoculum was proved infective by tongue inoculation. Twenty-five head of native cattle were kraaled together and sprayed with the tested inoculum through a suitable fly-spraying pump. The operator walked amongst the cattle, spraying their heads as they were turned towards him. The animals were kept under observation for twenty-one days, but no infection resulted. The animals were later placed in contact with virus reservoirs, and two reacted up to the sixteenth day, after which the remaining twenty-three reacted in the usual proportion to the tongue inoculation. In consequence of the disappointing result of this experiment the spraying method of producing infection was not pursued further.

(2) Inoculation of lesion virus into the subjacent tissues of the epidermis of interclavian cleft proved as effective as the tongue inoculation, generalised lesions occurring in the mouth forty-eight to seventy-two hours later.

(3) The intravenous inoculation of virus proved less certain of producing infection than the tongue inoculation, although one instance recorded in the 1933 campaign registered 100 per cent. infection. The difference of results occurring from this method of inoculation is difficult to understand. Possibly some peracute stage of virulence of the virus was obtained in the 1933 experiment, since subsequent investigations into this mode of inoculation in the 1933 campaign also failed to produce satisfactory results.

(4) An experiment was conducted to show the length of time that blood and lesion scrapings remain infective after generalisation. Three oxen showing generalised foot-and-mouth disease were selected and samples of (*a*) the blood, (*b*) the saliva and scrapings from mouth lesions, (*c*) scrapings from foot lesions were taken on the sixth and twelfth days after generalisation, the samples being placed in sterile preservative.

Thirty-six animals were then injected in the tongue with the six inocula thus provided. The animals showed no signs of having had the disease previously.

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Three out of the six animals used for the test of the saliva and mouth scrapings (sixth day) reacted, all others failed. The results indicated that the saliva and mouth scrapings were active on the sixth day, but no reactions could be obtained from scrapings taken on the twelfth day; neither the blood nor the foot lesion scrapings produced reactions from the sixth or twelfth-day samples. The thirty-three non-reacting animals were tested by a tongue inoculation of infective inoculum, and twenty-one subsequently reacted satisfactorily. Of the three non-reacting animals to the saliva and mouth scrapings (sixth-day inoculum), one gave a satisfactory reaction to this subsequent test.

(5) In view of the insusceptibility of native sheep and goats to foot-and-mouth disease by natural infection, the susceptibility of these animals to a tongue injection was investigated. Using a fine needle, two goats and two sheep were inoculated in the tongue with inoculum rich in virus; one sheep and one goat reacted locally at the site of injection, and the sheep developed a secondary lesion on the dorsum of the tongue. No generalisation was observed; no lesions in the feet developed, neither was pyrexia recorded. The other sheep and goat showed no reaction whatever.

Conclusion.

Origin of the Outbreak.—The origin of the outbreak was never definitely explained. The earliest infections discovered were about 80 miles north of Lake N'gami, which suggests that infection originated in the extreme north-west of the Territory, and travelled southwards through cattle movements. It would seem most probable therefore that the infection was introduced by some means through the Northern Border, especially in view of the fact that active disease existed in Barotseland, about 250 miles north of Lake N'gami. It is assumed that the outbreak did not originate from the 1933 outbreak for the following reasons:

(1) According to a report rendered by the Director of the Ministry of Agriculture and Fisheries Research Laboratory, Weybridge, England, on the typing of the virus, conducted at Pirbright, England, the virus of the 1934 outbreak was a different type to the 1933 outbreak, which proved to be a variant of the "O" type.

(2) Whilst it might be suggested that some mutation of the 1933 type had occurred, 375 miles of cattle-populated territory separate the 1933 outbreak from the earliest infections of the 1934 outbreak. Such a jump would seem to preclude reasonable possibility of the 1933 outbreak being associated with the 1934 outbreak. In this connection it is of interest to mention shortly the disease occurring in neighbouring countries at this time. Late in May an outbreak occurred at Kazangula, Northern Rhodesia, amongst 1,800 head of cattle which had been moved across the Zambesi River from an area of the Bechuanaland Protectorate in March. Early in July an isolated outbreak was reported from Southern Rhodesia on the Nuanetsi Ranch, in a herd of 600 head; and in October, Ousaka, in Northern Rhodesia; and Gobabis, in South-West Africa, became infected. Subsidiary outbreaks to the July outbreak occurred in Southern Rhodesia.

The only uncontrolled extension of the disease in the Bechuanaland Protectorate occurred in August, at Rakops, where it "jumped" the cordon and

appeared thirty miles east of it. This necessitated a loop cordon being laid down, and the inoculation of a further 30,000 head of cattle. The explanation of this extension of the disease was not shown. Previous to these outbreaks in 1934 the disease occurred in Southern Rhodesia in 1931, when inoculation was first undertaken to eradicate it.

Early in 1933 the Bechuanaland Protectorate became infected, and there was a small outbreak in the Transvaal and also in the Cape Province. Inoculation within a cordon in the foremost case and slaughter and strict quarantine in the latter cases were undertaken, and both systems succeeded in preventing uncontrolled spread. In August, 1933, an outbreak occurred in the Bechuanaland Protectorate on the Baralong Farms, five months after inoculation, and was assumed to be due to infection being kept alive by a chain of cases in animals which did not react to the inoculation. In 1933 an outbreak in Barotseland, Northern Rhodesia, was dealt with by inoculation. Between 1931 and 1935, therefore, the disease has been widely distributed over Central Southern Africa.

Reports from England indicate that the type of virus occurring in the Southern Rhodesia outbreak of 1933 and the 1933 outbreak in the Bechuanaland Protectorate were similar, whilst the 1934 Southern Rhodesia virus and the 1934 Bechuanaland Protectorate virus differed from one another and from the 1933 type.

The Effect of the Campaign.—The inoculation of the infected area appears to have freed the country of the disease, and nine months' continuous inspection of the inoculated area revealed no subsidiary outbreak. Extensive cattle movements under veterinary supervision have since taken place from the inoculated area through, and to uninfected areas, and no recurrence of the disease has been reported. This is indicative that "carriers" of foot-and-mouth disease did not exist in the circumstances obtaining in Bechuanaland. The campaign also served to establish greater contact with distant parts of the territory, demonstrated the use of the aeroplane in these parts, and a cattle census of the area, hitherto not obtained, resulted.

With regard to the disease, it may be stated that in Bechuanaland the disease was not a menace to native cattle. No mortality or serious disease consequences resulted, and from the actual disease point of view might have been disregarded, except for the necessity of preventing its spread to other countries, where its effects might have proved more damaging.

THE RÔLE OF THE VETERINARY SURGEON IN THE POULTRY INDUSTRY.

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IT is only a few years ago since it could have been said with little hesitation that the veterinary profession was not prepared to accept its responsibilities in relation to the health of poultry, but nowadays such a general accusation would

be quite untrue. During the past ten years members of the profession have devoted considerable time and research studying poultry disease problems, and as a result have asserted their rightful place as advisers to the poultry industry where health and disease matters are concerned.

There is one fundamental difference between the relationship of the veterinary practitioner and the poultry keeper as compared with the general farmer, *i.e.*, in the latter instance the veterinarian is usually prepared to give all the advice and treatment necessary where farm animals are concerned, whereas with poultry it is frequently necessary for him to consult a special laboratory. Veterinary surgeons, therefore, fall broadly into two classes—those with specialised knowledge in association with some particular poultry laboratory and the general practitioner who may act as intermediary between the farm and laboratory.

If it is agreed that the real function of the veterinary profession is to prevent animal disease and its spread to man, then it will be clear that in connection with poultry one of the best means of accomplishing this will be by suitable propaganda. Lectures to poultry societies, talks at young farmers' clubs, the radio, articles in the popular poultry press, pamphlets and text-books are all ways by which the veterinarian interested in poultry husbandry can assist the industry. It is equally important to ensure that all lectures on health and disease given at poultry institutes or agricultural colleges shall be given by duly qualified members of the veterinary profession. Nevertheless, it must be fully appreciated that much of this education can only be given if the fundamentals of the biology of poultry are understood completely. That this is not so cannot be disputed, and therefore much remains for the research worker to accomplish, particularly in the realms of avian physiology. In this connection special attention requires to be devoted to the study of the digestive and respiratory systems, for fully 75 per cent. of all poultry maladies are connected with a disfunctioning of these parts. Such work would automatically involve a better understanding of the principles of feeding and ventilation.

A clear insight into poultry disease problems arises as a result of the work which is necessary in the carrying out of the many thousands of post-mortem examinations annually. This may perhaps be considered the veterinarian's *forte*, because his intimate knowledge of disease processes as affecting domesticated birds has been acquired in a large measure solely by this means, and an ability to adopt and adapt this knowledge to the farm has been the means of controlling many severe outbreaks of disease.

Active co-operation between county poultry instructors and veterinary officials interested in avian pathology is an integral part of the welfare of the poultry industry both on the health and disease sides.

Further, it is high time local bye-laws or conditions of sale applicable to private markets were enforced, so that birds which are obviously affected with, suffering from, or exhibiting signs indicating the presence of infectious or contagious diseases must not be exposed for public sale. There is no doubt but that

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there has been a considerable dissemination of disease from farm to farm by this means. Regular market inspection by veterinary officials with a knowledge of poultry disease would go a long way in helping to check the present high death-rate amongst commercial stock.

In contrast with other domestic animals the veterinary surgeon is not often consulted with a view to treating affected flocks, but this is often the direct result of insufficient research work having brought forward no suitable "mass" methods of treatment. Nevertheless, there would seem little doubt it will not be long before suitable treatments are available for the prevention or cure of many common poultry diseases, particularly coccidiosis, blackhead, typhoid, tapeworms, etc. Further, although there are quite a number of operations carried out annually on prize or pedigree domesticated birds, research should still be prosecuted on the problem of general anæsthesia. Similarly, improvements in tuberculin testing, vaccine preparation and blood agglutination testing all require suitable attention.

It is not generally realised that a number of members of the veterinary profession have studied breeding problems from the scientific aspect, and their opinion on breed standardisation, in-breeding, stamina breeding, etc., would no doubt prove of great value to a number of pedigree breeders anxious to raise the standard of fertility and vigour of their stock. Finally, is it necessary to remind the reader that the subjects of chick sexing, sex-linkage and day-old pullet breeding are clearly within the province of the progressive veterinarian!

THE HEALTH OF ANIMALS AND ITS RELATION TO PUBLIC HEALTH.*

By A. E. CAMERON, M.C., V.D., V.S.

Chief Veterinary Inspector, Health of Animals Branch, Department of Agriculture, Ottawa.

THE Health of Animals Branch of the Federal Department of Agriculture is primarily concerned with preventing the introduction of disease into Canada and maintaining the health of livestock by controlling disease which may occur within the Dominion. The Meat and Canned Foods Act, which relates to export trade, is also administered by the Health of Animals Branch. The Pathological Division prepares biological products for the use of our inspectors, examines specimens and conducts research to assist in the control of disease.

While all these activities are conducted primarily to assist the livestock industry, they have a definite value in regard to public health through the control of diseases transmissible to man, such as rabies, anthrax, tuberculosis and contagious abortion in cattle. Such activities as meat inspection and supervision

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and testing of cattle, make an important contribution to the safeguarding of human health.

Our tuberculosis control policies, initiated in a small way more than thirty years ago, now involve the testing of about one million cattle each year. There are large areas in which all cattle have been tested, and in such districts the milk supply may be considered safe in so far as tuberculosis is concerned. In some municipalities individual herds are tested under the Accredited Herd Plan or the Supervised Herd Plan. The local health authorities pass by-laws requiring all herds supplying milk to be tuberculin tested. They do not, however, provide this service, but take advantage of the provisions of these plans, thus obtaining their milk supplies from tested cows without incurring any expense in connection with testing.

The number of cattle tested under the several plans which were in force in 1916 was 2,332, while up to 1935, 4,007,130 had been tested. At present 2,251,771 are under supervision. As the cattle population in the Dominion is approximately 8,485,000, this represents 26.5 per cent. of all cattle under test.

It is difficult to show the reduction in the extent of bovine tuberculosis, because a single badly-infected area may upset the figures for a particular year. There is, however, evidence that tuberculosis is being reduced, and large areas now have infection reduced to less than 0.5 per cent.

During the years 1929–35, 4,639,542 cattle and 2,992,623 calves, a total of 7,632,165, were slaughtered under inspection. Of these, 314,943 cattle were found to present evidence of tuberculosis on post-mortem examination. Available data concerning the findings in calves relate to 1934–35, when 474 of a total of 307,348 calves slaughtered were found to exhibit lesions, or approximately 0.15 per cent. If for the purpose of this discussion this percentage be used in calculating the number of calves exhibiting tuberculosis during the period 1929–35, an estimate of 4,615 would be obtained. The total number, therefore, of cattle and calves showing tuberculosis during the period of seven years as revealed by post-mortem examination would be 319,558, or approximately 4 per cent. If one deducts from the total number of animals slaughtered (7,632,165) the number of known reactors to official tuberculin tests (169,724), a net total of 7,462,441 is obtained. Deducting similarly the number of known reactors from the total number of animals showing tuberculosis on post-mortem examination, a figure of 149,843 animals is obtained, or approximately 2 per cent. Thus in over seven million cattle slaughtered under inspection in this period of seven years, from 1929–35 inclusive, approximately 2 per cent. showed infection with tuberculosis.

The data from tuberculin testing under the various plans of the Department of Agriculture indicate also that of approximately four million cattle tested to March 31st, 1935, 6.7 per cent. were reactors to the initial and subsequent tests. Of the total number of cattle slaughtered under inspection, approximately seven and a-half million (deducting reactors), and the four million tested, approximately 419,000 animals were positive to the test or showed tuberculosis on post-mortem, giving a percentage of 3.6.

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Contagious Abortion in Cattle (Bang's Disease).

Stock-owners are offered co-operation in eradicating Bang's disease from their herds. A suitable method of testing is available, using a blood sample. This plan was inaugurated in 1919, during which year thirty-two herds were under supervision, and the number has increased each year, until at present over 1,350 herds are under inspection. It is estimated that 20 per cent. of the herds in Canada are infected with this disease. In individual herds it has been found that an average of 15 per cent. of cattle react to the blood test. Reactors, except unbred yearlings and calves, are permanently marked for identification.

Commencing January 1st, 1936, cattle entering the United States must have a certificate of a negative blood test for Bang's disease made within sixty days. The Canadian regulations are similar. This will undoubtedly stimulate the interest of stock-owners in eradicating Bang's disease from their herds. The stringent regulations of the American Import Milk Act, requiring that dairies in Canada exporting milk or cream must have healthy cows and proper milk houses, and conform to proper standards, has resulted in improved conditions on many farms.

This is an example of how requirements of other countries may have unforeseen benefits. The dairies supplying milk were made sanitary and only healthy cattle retained. Many of the owners of cows with diseased udders now find that since their removal no other cases have occurred. It is well known that when a farmer sees his premises clean and his herd healthy he has a tendency to maintain it in a better condition even when not governed by regulations.

The Meat and Canned Foods Act.

This Act was necessary to meet the requirements of other countries so that our export trade in meat and meat-food products could continue and expand. There are some sixty packing establishments under permanent inspection and fifteen with temporary inspection. The inspection under the Meat and Canned Foods Act is thorough and probably second to none in the world. One hundred and sixty veterinarians are employed for their full time and are assisted by 87 lay inspectors who supervise sanitary measures and processing of meats. A careful ante-mortem and post-mortem examination is made by the veterinarians of all animals slaughtered for food in the packing houses under inspection. This is necessary, as no meats or meat food products may be exported from one province to another or out of Canada unless they have been passed and certified. The extent of this work may be appreciated from the following figures relative to the year ended March 31st, 1935 :

	Carcases approved	Carcases condemned	Portions condemned
Cattle	1,332,639	17,731 (1.31%)	349,145
Sheep...	956,219	1,917 (0.22%)	134,585
Swine...	2,852,214	9,911 (0.34%)	2,043,540
	5,141,072	29,559	2,527,270

There were also 396,115 poultry killed under inspection, of which 4,772 were condemned.

Of 808,461 adult cattle slaughtered under inspection, 4.73 per cent. were infected with tuberculosis. This figure, however, includes nearly 16,000 (1.97 per cent.) reactors to tuberculin tests which were slaughtered.

Of the swine slaughtered, 24.2 per cent. were infected with tuberculosis. Fortunately, infection in most cases is localised and slight, requiring condemnation of portions only. In swine, avian infection is included and probably represents a considerable percentage.

The packing-houses under federal inspection handle large quantities of meat which enter local or provincial trade, and almost 50 per cent. of all meat consumed in Canada is meat which has passed inspection under the Meat and Canned Foods Act. If consumers insist on obtaining such meats they are procurable, but a large percentage of the population probably do not know of the importance of using only inspected meat.

As the appearance of meat as sold, and especially of meat-food products, gives little indication of the wholesomeness of the original products in regard to freedom from disease or of the conditions under which it has been handled, it becomes a proper function of public health authorities to ensure adequate inspection and proper labelling.

Unsatisfactory conditions exist in many municipalities, and local authorities endeavour to meet the situation, including control of private slaughter-houses. It is generally accepted that a proper meat inspection service cannot be provided by a local authority if the slaughtering of animals is carried out in many small slaughter-houses, because only intermittent inspection is possible with the personnel available. Proper inspection is possible when large plants are involved or in municipal abattoirs where compulsory slaughter at such abattoirs is enforced. Advantage may well be taken of the federal meat inspection service by provincial or municipal authorities to provide inspected meat. To obtain the services of Dominion inspectors, the packing plant or abattoir must be engaged in export or interprovincial trade, and the volume of killing must merit the employment of a full-time inspector. Inspection is not limited to meat for export or interprovincial trade, but " Canada approved " meats are available for local use.

An important campaign is now being conducted in the United States to require that the inspection of meats within the individual states be raised to the standard of the Federal Bureau of Animal Industry. To bring this into effect an Act " to provide that the United States shall co-operate with the states in maintaining systems of meat inspection, to amend the Federal Meat Inspection Act of June 30th, 1906, (34 Stat. 674), as amended and supplemented for other purposes " has been outlined, and also Acts by the individual states which wish to take advantage of the Federal assistance. Accordingly each state would have its meat inspection law, and if the inspection were maintained and approved by the Federal Government, assistance to the extent of one-half the cost of state inspection would be

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paid by the Federal Government. The controlling interest involved by payment of half the cost by the United States Government would overcome the local difficulties often experienced in regulatory measures by other than national governments.

Trichinosis.

A recent outbreak of trichinosis in man in Montreal has attracted attention to this parasitic infection and its relation to meat inspection. Sixty-eight known cases of trichinosis in human beings occurred. The origin was traced to products intended to be eaten without cooking, which had been distributed by a local firm whose main supply was country-bred hogs. The first case showing symptoms was observed on October 15th and the last on November 10th, but it was only about November 7th that a diagnosis of trichinosis was made. Practically all the patients were in the habit of eating sausages, which are very often only slightly cooked or smoked. None of the plants in Montreal under federal inspection manufacture this type of sausage.

Trichinosis is much more prevalent than is usually supposed. It is estimated from post-mortem examinations that 20 per cent. of the people in the north-eastern states of the United States are infected, although not likely showing symptoms which are recognisable. It is well known that the list of diseases for which trichinosis has been mistaken is a very long one. Fortunately a skin test has been discovered which should simplify diagnosis. The antigen is made from trichinæ which have been removed from their cysts by digestion and ground up to make a 1 : 10,000 suspension.

The microscopic examination of pork is not satisfactory, as only relatively small portions can be searched and there is no assurance that other portions are free from trichinæ. If it should become necessary to examine pork, a precipitin test is reported to give satisfactory results. It is quite impracticable to examine the flesh of pigs for these parasites as a routine measure, but as fresh pork is cooked before being eaten, such examinations of pork are not considered necessary. In Canadian packing houses under federal inspection, all meats or meat products which are so prepared that they are usually eaten without cooking and which contain pork, such as summer sausage, Brunswick sausage, and Italian and Westphalian hams, etc., are treated by heating, refrigeration and curing in such a way as to preclude the possibility of trichinæ infection through their consumption. In export meats the particular requirements of the country of destination are observed.

The practice of feeding pork scraps to pigs is probably the source of infection, although it has been generally supposed that hogs are infected by eating rats. To kill trichinæ various methods are employed. The meat may be stored for twenty days at a temperature not higher than 5° F., or all parts of the flesh may be heated at a temperature not lower than 137° F. Sausage meat may be salted in pieces not exceeding $\frac{3}{4}$ inch in diameter, with $3\frac{1}{3}$ pounds of salt to each hundred pounds of meat. After the sausages are stuffed they are placed in a drying room

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for twenty days at a temperature not lower than 45° F. Hams may be dry-cured for forty days at a temperature not lower than 36° F. by salting with four pounds of salt per hundredweight. They should be examined at least once during this period and additional salt may be applied to the lean meat if necessary. Hams may also be pumped with pickle if desired. After curing they may be soaked in water at a temperature not higher than 70° F. for not more than fifteen hours, during which time the water may be changed once. Finally, they are pale-dried or smoked for not less than ten days at a temperature not less than 95° F.

Clinical Articles

An Unusual Foot Case.

By T. G. HEATLEY, O.B.E., M.R.C.V.S.

Woodbridge.

THE subject of this article was an aged mare. About twelve months ago she was reported to be "quidding." It was necessary to remove three molars. After this the mare picked up and she was worked regularly until the time of the present injury. On September 29th the horse took a load of vegetables into Ipswich. She was quite normal until the owner unyoked her. He pulled her round suddenly, and the mare immediately held her hind foot up as if in pain.

I saw the mare in the morning of the 30th. She was in a shed in a meadow and alone. Respirations were accelerated, temperature 102° F., and she was lifting the near hind leg up and down. There was no response to the hammer on the hoof. No lesions were observable, but she would not shift over off the off-hind foot. I was of opinion that the sudden turn had probably injured the loins, and that the leg symptoms were probably due to "pins-and-needle" pains. I prescribed expectant treatment, informing the owner that if the mare got down she would probably do no good. On October 1st the owner informed me that the mare was taking her rest and getting up quite reasonably. On October 2nd it was reported that the mare had got the off-hind hoof off, and on my advice the animal was destroyed. The shed hoof showed no signs of external trauma. There had been considerable hæmorrhage, and the horny laminae were swollen and of a yellowish-red colour.

Examination of the carcase revealed no other abnormality which one could associate with the accident other than some ankylosis in the lumbar spine. I sent the hoof and vertebræ to Dr. McCunn, and he offered the explanation below: "The most obvious explanation which occurs to me is that the foot was the seat of an acute laminitis occasioned by the strain placed upon it when the near hind limb was in disuse owing to pain of an unknown origin."

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Two Accidents.

By G. MAYALL, M.R.C.V.S.

Bolton.

(1) A CAIRN terrier, "Topsy," was brought to me on January 13th. She lived near the borders of a wood where there were many rabbits. On the night of January 10th she got lost, and nothing was heard or seen of her until she crawled home on January 13th. On examination a piece of steel wire was found tightly bound round her body, one broken end of which had penetrated her abdomen and another broken piece was tightly bound round her near hind foot, making a deep wound and penetrating the foot above the right digit. The wire round the body was cut through, unwound, and the broken end drawn out of the abdominal wound. The wire round the foot was removed with difficulty, and much force had to be used to pull it out, and one toe was cut to the bone.

The abdominal wound was dressed and a stick of iodoform bougie inserted, and some bougies were given to the owner to insert after cleaning the wound with antiseptic lotion. The parts of the foot were placed as nearly as possible in apposition, and bandaged, and a foot bag put on.

The wounds were rather serious, but the wire was clean (evidently a recently set rabbit snare), and the dog of a quiet and sensible nature. The owner was told that she would probably recover eventually. She was treated at the surgery on January 16th, 20th, 24th and 31st, in the same manner as indicated above, with the addition of an antiseptic stick of boracic acid and chinosol being applied to the wounds from January 16th to 31st, and antiseptic dusting powder to the foot. The foot wound took the most time in healing, but eventually did well.

(2) On October 16th a Schipperke called "Squibs" was brought to me for examination and treatment after being knocked down by a motor car. There was evidence (by an abrasion under the chin on the left side and twisting of the neck round on the body to the left, and some slight oral bleeding) of a severe blow. The little bitch was in much pain and cried fitfully. On putting the head straight manually it went back again on the body when released. Examination of the cervical vertebræ revealed no fracture or dislocation. The abnormal position seemed to be due to concussion and injury to the muscles and ligaments of the neck. A light bandage was put round the neck and a well-shaped and comfortable circular wooden splint applied to the neck and fixed in position with an elastoplast bandage. This kept the head and neck as straight as that of the ladies with long necks that recently visited this country. The chin wound was dressed with powder. Whilst attending to the bitch she vomited, which I find dogs frequently do when they have had a blow on the mouth or head. To induce sleep and calm an Adalin tablet (Bayer) was given, and the bitch was sent home, a guarded prognosis being given. She went to sleep on getting home, and seemed out of pain on the 17th, but kept wandering round and round in a circular manner to the right. On October 19th the splint and bandages were removed from the

neck, but the head was held straight and the bitch still went round and round to the right. On examination on October 20th, the left eye was red and bloodshot, so an eye lotion of

℞	Glycerin acid tann.	1 drachm
	Sod. biborat.	80 gr.
	Glycerin. pur.	2 drachms
	Aqua camph.	3 ounces
	Aqua distil.	ad 8 ounces

was prescribed, to be used half-and-half with warm water two or three times daily. A bottle of medicine containing 4-grain doses of pot. iodide and 4-minim doses of tincture of gentian was prescribed, the dose to be given two or three times daily. The eye cleared up on October 27th, and the bitch was then put on to cod-liver oil and liquor arsenicalis, and with the exception of not being quite so good tempered as usual she has made an excellent recovery. She ceased wandering round and round on October 24th.

Hæmoptysis.

By HAMILTON KIRK, M.R.C.V.S.
London.

HÆMOPTYSIS in dogs is by no means common, and this is my reason for recording a case which recently occurred in my practice. Casting back over the day-book for the last five years, I find that I have not previously encountered a single case.

The subject was a two and a-half year old Chow which at bed-time one evening was said to be in its usual health and spirits. The following morning the dog was listless, refused to feed or move, was breathing rapidly, and was said to be having short fits. In addition the owner reported that it had vomited blood, and had probably been maliciously poisoned. Upon arrival that morning I saw considerable cyanosis of the mucous membranes, a rapid, weak pulse, and a temperature of 103° F. The blood about the floor was examined, and was found to be very bright-red and frothy, indicating the lungs and not the stomach as its source. I found, too, that frothy blood was oozing from the nostrils. My first thought as to ætiology was a tuberculous lung, but it seemed at once doubtful whether this could really be the cause in view of the great rarity of such a phenomenon among dogs. Upon auscultation of the chest, loud bronchial *râles* could be heard over all parts of the lungs on both sides, and I inclined towards a diagnosis of acute bronchitis. This did not, however, explain to my mind why there should be pulmonary hæmorrhage. In truth, my diagnosis was tentative, and the treatment must necessarily be dependent upon a decision, and I could not get it entirely out of my mind that the dog might have phthisis, with a consequential breakdown of lung tissue and hæmoptysis. To satisfy the owner that no foreign body had been swallowed to account for the blood which she thought was emanating from

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the stomach, I radiographed the dog. The skiagraph revealed no foreign body nor, indeed, any abnormality. I prescribed digitalis pills to augment the heart action, and requested that the dog be kept absolutely quiet, hoping that in the course of an hour or two there would be no recurrence of hæmorrhage. The same evening I learned that the dog had died. The next morning a post-mortem revealed acute congestion of both lungs, the greater part of these organs being practically black, but by no means solidified. I was unable to discover what could have caused such sudden and acute congestion with hæmorrhage.

A METASTATIC ABSCESS IN A FOAL.

By RICHARD HUDSON, F.R.C.V.S.
Retford.

THE subject was a hunter foal six months old. It was in good condition and although it was suggested that it was doing too well, I did not think so. It was found lame on the near fore-leg with a swelling at the coronet ; and later on a small hole, like a barbed-wire puncture, was noticed at the rear of the pastern just above the foot. Antiseptic dressings were applied by the owner for a few days, and later I was asked to see it.

The swelling round the coronet felt as though it was either underrun with pus or perhaps due to distension from the pedal joint. I could not tell which. The small hole in the heel was discharging a little pus, but I could not squeeze anything out to show communication with the swelling on the coronet. I thought of the possibility of joint-evil, but there were no systemic symptoms other than what the foot condition might set up if it had resulted from a puncture. I prescribed lotion of hydrag. perchlor, gr. viii; formalin, dram 1; aqua, ounce 8, to be injected twice daily with a small syringe, and to be applied to the wound and coronet with a swab of cotton wool, and bandaged on.

When seen three days later the patient was less lame, the swelling subsiding and the discharge hardly perceptible on the swab. A few days afterwards the owner reported that the animal was about sound, and that he had removed it to another field. Soon after removal, however, it developed a severe lameness in the other fore-leg just above the knee, involving the flexor tendons above, through and below the carpal sheath. The mucous membranes were infected, pulse fast and temperature 106° F. No weight could be put on the limb, and the foal was in considerable pain. The condition was diagnosed as a metastatic abscess, possibly of joint-evil origin.

Fomentations were applied and antiseptic febrifuges administered, but without benefit. Two days later the swelling was lanced and a quantity of blood-stained serous fluid containing lymph clots evacuated. The leg now appeared deformed above the knee as though fractured, but no crepitas could be detected. It was evident it could not live long, but the owner would not have it destroyed.

The post-mortem examination showed the foot wound healing satisfactorily.

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The radions on the off fore-leg had separated at the epiphysis, and the cavity formed contained bloody serous fluid which penetrated along the muscles and tendons behind the knee.

A careful search was made for any joint-evil focus of infection, but none could be found, and in the absence of such a one the only conclusion I could come to was that the infection at the knee took place from the puncture wound in the opposite foot.

Reviews

Control of Animal Parasites: General Principles and their Application. By M. C. HALL, Senior Zoologist, United States Department of Agriculture. London: Baillière, Tindall & Cox. 1936. Price 10s.

THIS is indeed a unique book in the field of parasitology. Instead of writing detailed descriptions of parasites, their life histories, etc., all parasites are considered from a broad viewpoint, and then representative groups are discussed in a stimulating manner never before attempted in book form. The author is widely known as the commander-in-chief of the forces interested in combating parasites. He gives us a view of the battlefield from a height that few scientists have attained. No wonder then that he has turned to military strategy and tactics as a method for presenting the subject. His philosophical outlook is most refreshing. The diagrams accompanying the text are so clear as to be readily etched in the mind of the veterinarian in the field. They are equally of value in presenting the problems of parasite control to the livestock owner.

The Care of Greyhounds. By A. CROXTON SMITH, with a Foreword by Brig.-General A. C. CRITCHLEY, C.M.G., D.S.O. Printed and produced for the Greyhound Racing Association, Ltd., by the Fanfare Press, London.

This booklet, beautifully illustrated and of interest to all those who spend time and money in the breeding and training of greyhounds, deals with the work done with the greyhounds at the Hook, Northaw. It describes the layout, plan, and construction of the kennels, the day's work, welfare of the staff, and the best food for greyhounds. The illustrations are a strong feature of the work, and comprise an aerial view of the Hook, Northaw, puppies at Blythe Bridge, Staffordshire, map showing position of kennels and race-courses, and photographic reproduction of a journey with the camera through the grounds and buildings of the Hook. The dogs are under the veterinary care of Mr. J. K. Bateman, M.R.C.V.S., B.Sc., whom we were very pleased to meet at Scarborough, and to find that he had made such an excellent recovery from his very serious accident. No finer book has ever been written and illustrated on the modern cult of greyhounds and greyhound racing, and it is a credit to all those concerned in its production.

Experimental and Clinical Studies of the Spine of the Dog. By GEOFFREY B. BROOK, D.Sc., F.R.C.V.S. London: Baillière, Tindall & Cox. Price 5s.

THIS little volume of 150 pages includes some 50 skiagraphs and represents a new line of original work, which was the subject of the D.Sc. thesis of Edinburgh University, by Dr. Geoffrey Bernard Brook, F.R.C.V.S., Centenary Post-Graduate Research Fellow of the Royal (Dick) Veterinary College, Edinburgh. Although largely experimental, there is much of pioneer value for the practitioner who specialises in X-ray

work of the bones of the dog, and who is particularly interested in spinal puncture and spinal anæsthesia. In addition it will be of great practical use to any clinician who may be called upon to diagnose and treat diseases and injuries of the spine of the dog. As the thesis for the D.Sc. degree it is well worthy of the award which it brought to the writer, and every physiological laboratory should have it on its bookshelf.

New Book for Pig Breeders. London: National Pig Breeders' Association.

A ONE HUNDRED-PAGE booklet on the breeding, feeding and management of pigs has just been issued by the National Pig Breeders' Association. The section devoted to "Hints for Beginners" is contributed by Mr. J. W. Reid, Vice-Principal of the Herts Institute of Agriculture. The important subject of pedigree pig breeding —the foundation of a herd and the policy to be observed in successful development— is in the form of extracts from an address by the late Mr. Leopold C. Paget. "Common Ailments in Pigs" is a feature dealt with authoritatively but simply by Major C. G. Saunders, D.S.O., M.R.C.V.S. Adequately illustrated, of handy size and attractively printed, the booklet costs 1*s.* 3*d.*, post free, from the National Pig Breeders' Association, Victoria House, Southampton Row, London— W.C.1.

The Internal Parasites and Parasitic Diseases of Sheep. By I. CLUNES ROSS and H. McL. GORDON. London and Sydney: Angus & Robertson, Ltd. Price 25*s.*

THIS book is one of the very latest of its kind, and the authors are specialists in a country where the sheep is a commercial asset, which makes it well worth while for Government departments to encourage research into these diseases. As a text-book for the student it is most clearly and excellently written; and as a work for the practitioner who has sheep amongst his patients it will be found to be a most valuable addition to his clinical bookshelf.

Just Cats. By LOWES D. LUARD and T. O. BEACHCROFT. London: Country Life, Ltd. Price 10*s.* 6*d.*

THIS is a well-illustrated and well-produced book, and it is made all the more enjoyable by the witty pen of the writer, Mr. T. O. Beachcroft. While not in any sense of the word scientific, this book gives an insight into cats from a new point of view, and the drawings by the artist, Mr. Lowes D. Luard, like all his other drawings of animals, cover practically every posture and mood, and while being anatomically correct, give a life and individuality to the subject which no mere slavish copying of forms could denote. Although some people are not attracted by cats, the majority are to one sort or another, and all should enjoy this book, which has writings and drawings of all breeds and types; and after reading it one will look at cats from another and different angle than heretofore.

Die Tierischen Parasiten der Haus und Nutziere sowie des Menschen. By J. FIEBIGER. Berlin and Vienna: Urban and Schwarzenberg. Price Rm. 19.

DR. FIEBIGER, Professor in the Veterinary High School of the University of Vienna, has rendered good work to his colleagues in the production which he has just issued of a standard work on parasites for all classes of veterinary patients. The work is a matter of some 375 pages with 352 illustrations clearly and well described, and so arranged that it is suitable as a text-book equally for student and practitioner. For those who read German it is an ideal work.

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News

THE CENTENARY CELEBRATION OF THE ROYAL VETERINARY COLLEGE MEDICAL ASSOCIATION.

THE celebration, held at the Royal Veterinary College on November 5th, took the form of the presentation of a series of papers, demonstrations and operations in the morning and afternoon. In the evening the Members of the Association were invited to participate in the Dinner and Dance of the Central Veterinary Society held at the May Fair Hotel. The programme was arranged as follows:

In the Morning.—9.10 to 9.30, official opening of the celebration by Sir Frederick Hobday, C.M.G., F.R.C.V.S., F.R.S.E., Dr. Vet. Med. (Zürich). 9.30 to 10.30, a series of four papers of fifteen minutes each dealing with the duties and prospects of the veterinary officer in the various branches of State medicine. The papers were presented by: H. E. Bywater, M.R.C.V.S., Municipal Veterinary Officer; J. Smith, O.B.E., J.P., Colonial Veterinary Officer; W. Rhodes, M.R.C.V.S., County Veterinary Officer; E. Brown, M.R.C.V.S., Ministry Veterinary Officer; Chairman, J. W. H. Holmes, M.R.C.V.S., D.V.S.M., President, Royal Veterinary College, V.M.A. 10.45 to 11.15, "The Discovery of the Life-History of the Liver Fluke, as an Illustration of the General Process of Scientific Discovery," by E. L. Taylor, M.R.C.V.S., M.V.Sc., D.V.H.; Chairman, Mr. J. A. Pasfield. 11.30 to 12, "Some Diseases of Sheep," an illustrated lecture by Major T. Dalling, M.R.C.V.S.; Chairman, Mr. P. Z. Mackenzie. 12.15 to 12.45, "Johne's Disease," an illustrated lecture by Major G. W. Dunkin, M.R.C.V.S., D.V.H.; Chairman, Mr. F. R. Spratling.

In the Afternoon.—2 to 2.30, "Toxæmias in the Cow," an illustrated lecture by Capt. J. R. Barker, M.R.C.V.S., D.V.H.; Chairman, Miss M. Delavoye. 2.40 to 3.15, Demonstration on the Examination of the Horse for Soundness, by Capt. L. G. Gryspeerdt, M.R.C.V.S.; assistants—Mr. W. J. Barclay Watson and Miss L. H. Phillips. 2.40 to 3.15, a surgical demonstration of Caponising, by J. S. Steward, F.R.C.V.S., D.V.S.M.; assistants—Miss W. M. Brancker and Mr. D. A. Lake. 3.30 to 4.15, a surgical demonstration of the Roaring Operation in the Standing Position, by Major G. H. S. Townsend, O.B.E., M.C., R.A.V.C.; assistants—Mr. R. G. Crowhurst and Mr. D. V. Balls.

As the accommodation at the College was limited owing to the rebuilding, all lectures and papers were presented in the Hall of the Working Men's College in Camden Street, Crowndale Road, which is three minutes walk from the Royal Veterinary College. A cordial invitation was extended to all members of the Royal College of Veterinary Surgeons, many of whom accepted. The proceedings were a great success.

RESEARCH ON GRASS SICKNESS IN HORSES.

IN view of the losses which have been caused by grass sickness in horses and the natural anxiety which has arisen with regard to this disease, the following brief review of the position as it presents itself to the Agricultural Research Council may be of interest. Close touch has been maintained by the Agricultural Research Council with the scientific work of the staff of the Animal Diseases Research Association, whose headquarters are at the Moredun Institute, Gilmerton, Midlothian, and in the first report of the council for the period July, 1931 to September 30th, 1933, the favourable impression which the Council had formed of the researches undertaken by the staff of the Association was recorded. In their second report, which has just

been issued, no direct reference is made to the prolonged and difficult investigations on grass sickness which for some years past have been conducted by the Animal Diseases Research Association, both in the laboratory and in the field. During the period covered by the report, grass sickness had not been exceptionally prevalent. Since the end of the period, however, a devastating outbreak of the disease has occurred, which is said to have caused the death of 1,500 horses in Scotland alone. At the request of the Department of Agriculture for Scotland, the Council's Animal Diseases and Nutrition Committees have therefore recently examined the progress made by the staff of the Animal Diseases Research Association in their investigations into grass sickness, and have had the advantage of hearing a full account of the work and of the future programme from Dr. J. Russell Greig, the director, and Dr. W. S. Gordon, the bacteriologist. The Agricultural Research Council are satisfied that no possible clue to the cause and ultimate prevention of the disease has been neglected; that the investigations have been well conceived and ably pursued; and that in consultation with the Research Committee of the Animal Diseases Research Association, and latterly with the Scottish Board of Research in Veterinary Science, every opportunity has been seized of seeking the advice of specialists who might assist in the unravelling of the cause of this baffling disease. While no cure for the disease has yet been discovered, this has not been due to lack of funds or of research workers so much as to the inherent difficulty of the problem. Hopeful advances in knowledge have been made, and the Council are convinced that the programme of research now adopted, including large-scale immunisation experiments, is wisely planned and should be vigorously pursued. The Council have appointed a small sub-committee of their animal diseases and nutrition committees which will maintain contact with the workers at Moredun and keep the Council informed of the progress of the researches. The Council have also recommended that a contingencies fund should be made available, so that those at the Moredun Institute engaged in the grass-sickness investigations may know that if a special need arises, it can be met immediately.

NATIONAL MARK SHOPPING FOR CHRISTMAS.

THE housewife is now well aware that the best produce of England and Wales bears the National Mark, the quality being closely controlled. The use of the mark is a part of the policy to encourage home agriculture. The National mark appears on such every-day commodities as beef (in certain areas); eggs and poultry, creamery butter, cheese, canned and bottled fruit and vegetables, fruit-juice syrups, wheat flour, wheat flakes, honey, jam, perry, cider, and fresh fruit and vegetables. Retailers are alive to the merits of graded and standardised produce. They appreciate the convenience of obtaining home produce of the best quality, required to satisfy their customers. National-mark groceries in particular are to be found in ample supply in most grocery shops and stores throughout the country, and retail provision merchants are usually anxious to add to their National mark stocks in order to satisfy the individaul requirements of their customers. With the approach of Christmas they are expecting an increased demand for the high quality products which the housewife can so readily distinguish by the National-mark sign on the goods. With a view to assisting the housewife to obtain National-mark foodstuffs, the Ministry of Agriculture, on the advice of the trade committees concerned, has compiled a list of approved retailers who have undertaken to stock National-mark groceries and to co-operate with the Ministry in maintaining the quality standards. This new step to foster the demand for the best produce of the home country has had for its inception the whole-hearted support of the National Federation of Grocers' and Provision Dealers' Associations and the Co-operative movement. Admission to the Roll is granted on the recommendation

of the appropriate trade organisation. The gratifying response which has been received from the retail trade is in no small part due to the efforts of these organisations. Each retail provision merchant who has enrolled as a National-mark stockist has received from the Ministry of Agriculture a certificate of enrolment, which he has been asked to display prominently in his shop. A list of the grocers concerned has been published as Marketing Leaflet 62, and copies may be obtained free of charge on application to the Ministry at 10, Whitehall Place, S.W.1. The list of stockists of National-mark groceries does not purport to be exhaustive. It comprises only those who are on the Roll of Approved Distributors and who have undertaken certain obligations. National mark groceries are, of course, obtainable from very many shops which do not appear in the list, but those on the list have definitely undertaken to support this National movement.

COMPENSATION TO VETERINARY OFFICER—CLOGHER RURAL COUNCIL, IRISH FREE STATE.

When the Ministry of Home Affairs wrote to Clogher Rural Council recently directing them to pay compensation, fixed by the Ministry at £640, to Mr. John Loughran, J.P., Aughnacloy, formerly veterinary inspector under the Dairies and Cowsheds Regulations and Slaughter-houses Orders, on the termination of his appointment under the provisions of the Diseases of Animals Act, 1934, members protested and maintained that the Ministry should bear their portion of the compensation. Mr. J. E. Hackett stated that the appointment of Mr. Loughran at a salary of £225 a year was forced on the former Council by the Ministry, following repeated reports and recommendations of the Ministry's inspector. The appointment of Mr. Loughran at such a high salary was not the wish of the Council, who requested the Ministry at the time to make the salary £40 a year.

The Chairman (Mr. G. A. Stockdale) said the amount of compensation looked big, but, of course, the Council had been saved from paying £225 for the last two years, and would be saved from paying in the future.

Mr. Hackett maintained that if the Council was not asked to pay directly they would have to pay indirectly for the inspection under the new conditions. Mr. P. R. Peebles, vice-chairman, said it would be the ratepayers who would have to pay anyhow. Eventually, after further protests, it was agreed to pay the amount of compensation to Mr. Loughran—*Irish News*.

VETERINARY EDUCATION—COMMITTEE OF INQUIRY APPOINTED.

The Secretary of State for Scotland and the Minister of Agriculture have appointed the following to be a committee to review the facilities available for veterinary education in Great Britain in relation to the probable future demand for qualified veterinary surgeons and to report thereon, and in particular to make recommendations as to the provision which should be made from public funds in the five years 1937–42 in aid of the maintenance expenses of institutions providing veterinary education: The Rt. Hon. Sir Thomas Molony, Bt., M.A., LL.D., K.C.; Sir James Currie, K.C.M.G., K.B.E., J.P.; Thomas Loveday, Esq., M.A., LL.D.; Sir John Robertson, C.M.G., O.B.E., M.D., LL.D.; and John Smith, Esq., O.B.E., J.P., M.R.C.V.S. Sir Thomas Molony has been appointed Chairman of the Committee, and Mr. V. E. Wilkins, of the Ministry of Agriculture, and Mr. W. N. McWilliam, of the Department of Agriculture for Scotland, have been appointed joint secretaries.

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N.V.M.A. CONGRESS, 1937.

AFTER consultation with the officials of the Bournemouth Corporation it has been decided to hold the 1937 Congress of the Association from July 26th to July 30th, inclusive. The Royal Bath Hotel has been selected as the venue for the social functions of the Conference.

Preparations and Appliances

"SOL-VIT-AX" VETERINARY COD LIVER OIL

WE have received literature and samples from the British Cod Liver Oil Producers (Hull), Ltd., of "Sol-Vit-Ax" Veterinary Cod Liver Oil, which they guarantee cannot cause digestive troubles or taint the flesh of birds and animals to which it is fed. They also guarantee this product to be of a very high standard, and to contain unsaponifiable matter below 1.5 per cent. To ensure this, over eighty-one biological tests of the vitamin "D" potency of their cod-liver oil were made since January 1st, 1935, at a cost of over £1,000. Since the existing facilities in the country for independent biological testing of vitamin D have proved quite inadequate for the large number of tests they desire to make to enable them to guarantee the vitamin D potency of their increasing production, they have built and equipped their own biological laboratory at a cost of over £5,000. It is claimed that no other cod liver oil refiners in the country provide such facilities to ensure the uniform quality and vitamin potency of their product. The cod liver oil itself is extracted at sea, on board the modern long-distance trawlers operating from the port of Hull, within thirty minutes of the fish being caught. British Cod Liver Oil Producers (Hull), Ltd., state that as these trawlers return to St. Andrew's Dock they take delivery of all the oil produced, and the processes incidental to its preparation for the veterinary cod liver oil market are carried out in their new refinery on the outskirts of Hull, which cost over £90,000, and is claimed to be the largest and most modernly-equipped cod liver oil refinery in the world. "Sol-Vit-Ax" Brand Veterinary Cod Liver Oil is of medicinal standard, in that it is guaranteed to comply with the chemical tests of the British Pharmacopœia, but has not been deprived of its natural fat. The two booklets "Hints to Buyers of Cod Liver Oil," and "Cod Liver Oil for Feeding Purposes" contain many interesting facts and tables, and if required more detailed instructions and special literature will be sent on inquiry. Literature dealing more extensively with the use of cod liver oil for veterinary purposes is in the course of preparation and when completed will be made readily available. In our opinion the veterinary surgeon will no doubt find this product of particular use to himself and to his clients, and should further information be required, an inquiry addressed to British Cod Liver Oil Producers (Hull), Ltd., St. Andrew's Dock, Hull, will be attended to immediately. "Sol-Vit-Ax" is packed by the producers themselves in 1, 5 and 10 gallon tins, and in 25 and 50 gallon steel drums.

Personal

THE Government Commission of the Central Executive Committee of the Autonomous Tatar Republic celebrated the jubilee of Professor Charles H. Bohl, Honorary Scientist in Research Work and Technics, Member of the Central Executive Committee, Member of Kazan Town Council, Permanent Director of Kazan Veterinary Institute

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since 1919, Director of Veterinary Scientific Research Institute, Doctor of Veterinary Science, on the occasion of his forty years of scientific and social work. The meeting was held in Kazan on November 29th, at 6 p.m., at the House of Science and Technics, and a conference of scientists took place on November 30th.

The Governors of the Royal Veterinary College have been pleased to confer the title of Emeritus Professor of Surgery on Professor Sir Frederick Hobday, C.M.G., F.R.C.V.S., F.R.S.E., on his retirement from the Chair of Surgery at the Royal Veterinary College. This is the first occasion on which this title has been conferred by any British Veterinary College upon a member of its Staff.

We regret to note the death of Professor F. Hendricks, Emeritus Professor of Veterinary Medicine in the Belgian Veterinary School.

Publishers' Notices

All communications should be addressed to 7 & 8, Henrietta Street, Covent Garden, London, W.C. 2. Telephone: Temple Bar 8568. Telegrams: "Baillière Phone, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

Copy of advertisements should be in the hands of the publishers—Baillière, Tindall and Cox—not later than the 25th of the month, or if proof is required, not later than the 23rd.

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